# Viewers' Guide to the botany of desire

Based on the book by Michael Pollan




This guide to *The Botany of Desire*, the PBS television documentary based on the book by Michael Pollan[1], is designed to help viewers get the most from their viewing experience. It provides a synopsis of the film and offers discussion questions about each of its four chapters that can help audiences use the film as a springboard for exploring their own thoughts and experiences.

Viewers are also encouraged to go to our website, http://www.pbs.org/thebotanyofdesire, which offers a rich assortment of text, graphics, and video that all complement and enhance the film. The website also provides curriculum resources for teachers.

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# Film Overview

Flowers. Trees. Plants. We've always thought that *we* controlled *them*. But what if, in fact, *they* have been shaping *us*? Using this provocative question as a jumping off point, *The Botany of Desire* takes viewers on an exploration of our relationship with the plant world — seen from the *plants'* point of view.

School children often learn about the mutually beneficial relationship between honeybees and flowers. To make their honey, the bees collect the flowers' nectar and in the process spread pollen, which enables the flowers to reproduce. *The Botany of Desire* proposes that people and domesticated plants have formed a similarly reciprocal relationship. "We don't give nearly enough credit to plants," says Pollan. "They've been working on *us* — they've been using us — for their own purposes."

*The Botany of Desire* examines this relationship by telling the stories of four plants that ensured their survival and expanded their habitat by satisfying our most basic yearnings. Connecting fundamental human desires for sweetness, beauty, intoxication and control with the plants that satisfy them — the apple, the tulip, marijuana, and the potato — *The Botany of Desire* intends to show that we humans don't stand outside the web of nature; we are very much a part of it.

The program begins with Pollan in a California garden and sets off to roam the world – from the potato fields of Idaho and Peru to the apple orchards of New England and Kazakhstan; from a medical marijuana hot house to the lush tulip gardens of the Netherlands.

With Pollan as on-screen guide, *The Botany of Desire* explores what he calls the "dance of domestication" between people and plants. By exploring the history of these four familiar plants, the film seeks to answer the question: Who really has been domesticating whom?

[1]*The Botany of Desire: A Plant's-Eye View of the World* was published in 2001.

[2]*This material is based upon work supported by the National Science Foundation under Grant No. 0307967. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.*

# Chapter 1: Sweetness

*The Botany of Desire* traces the apple's journey from its origin in the ancient forests of Central Asia, across the Silk Road to Europe, and eventually to America. There, in the early 19th century, it found its ultimate promoter: an eccentric character named John Chapman, who became known as Johnny Appleseed. Unlike most of the commercial apple trees cultivated today, which are grown by grafting buds onto young tree stalks, Chapman's apple trees – as you might expect from his nickname – were grown from apple seeds. Pollan explains the surprising fact that apples rarely pass on their flavor or even their appearance through their seeds. Apple trees grown from seeds tend to be biologically very diverse, and most of the fruit those trees will bear will taste bitter rather than sweet.

So Chapman's apples were not particularly tasty to eat. Yet these bitter apples were perfect for something — the making of alcoholic, or "hard" cider, a potent libation that became the drink of choice for everyone from paupers to presidents. But by the late 19th century, drunkenness was on the rise, and an outcry, led by the hatchet-wielding prohibitionist Carrie Nation, arose against the evil apple.

It wasn't until after 1900 that the apple became the fruit we know today. Growers cloned the sweetest apples by grafting them, and ingeniously marketed them as the ultimate health food, guaranteed to "keep the doctor away." Soon, only a handful of varieties of apples were being produced, in vast operations that scientists call "monocultures," which grow just one genetic variety.

Stripped of the genetic diversity plants rely on to survive disease, the relatively few popular apple varieties grown in monoculture have become increasingly vulnerable to insects, bacteria and viruses. Today, apple growers are some of the biggest consumers of pesticides. Scientists in Geneva, New York, are trying to help the apple prosper with fewer pesticides by harnessing the defenses that lie hidden in its genes. And in Northern New Hampshire, an independent-minded apple grower, who raises a variety of antique apples, hopes to revive the market for that once vilified drink, hard apple cider.

*"We give ourselves altogether too much credit in our dealings with other species."*

– Michael Pollan,
*The Botany of Desire*

Chapter 1

# Discussion Questions

1. In New England, apple picking is an autumn ritual for kids and has been for years. Are there similar harvest rituals in your community? Do you participate in them? Why? What draws you to these rituals?

2. The desire for sweetness is hardwired in human beings. We probably evolved in this direction because edible plants are fairly rare in nature, and sweetness was usually an indication to early humans that a plant was both safe to eat and rich in the calories we needed to ensure we didn't starve. Today, given the proliferation of artificially sweetened products available to us, does our evolution betray us or have we betrayed our evolution? Explain what you mean.

3. Johnny Appleseed is said to have compared himself to a bee. What do you think he meant? Is it an accurate analogy?

4. Historians think that Johnny Appleseed refused to graft apples because of his religious beliefs — that he thought grafting was tampering with the natural world, and therefore wrong. Do you see any similarities between his view and the modern emphasis on biodiverse gardening? How are they similar? How are they different? Would Johnny Appleseed be likely to have philosophical qualms about today's monoculture style of apple growing? How about you?

5. In referring to the negative perception of the apple by prohibitionists like Carrie Nation, Michael Pollan talks about the return of the apple tree to the Biblical Garden of Eden. Can you think of other edibles that have similarly been subjected to changing perceptions of their value to us, in the areas of health, lifestyle or social mores?

6. Compare the apple industry's "an apple a day keeps the doctor away" to more modern slogans involving food products. What has been their impact? What if it had been *"broccoli today keeps the doctor away?"* Would we have seen a similar reaction among consumers, or is there something peculiar about an apple that makes it uniquely appropriate for the marketing jingle?

# Chapter 2: Beauty

By satisfying the human desire for beauty, the tulip has risen from obscurity to fame — but along the way, it has also wreaked havoc. *The Botany of Desire* travels to the Netherlands, the home of "tulip mania," and introduces the viewer to growers and breeders who devote their lives to this lovely flower, which serves no practical human purpose other than to bring pleasure to our eyes.

Like the apple, the first wild tulips sprang up in Central Asia. They made their way to Turkey, where they bewitched one of the world's most powerful men, Sultan Ahmed III of the Ottoman Empire, whose reckless spending on the flowers helped to topple him from his throne.

But the trouble that tulips caused for the sultan paled in comparison to what happened in the Netherlands in the early 17th century. Between 1634 and 1637, tulips swept the Dutch into a collective frenzy that became known as "tulip mania." As the Dutch became rich through their dominance of world trade, it became fashionable to cultivate impressive flower gardens. And nothing said success like a relatively new arrival from the East: the tulip — particularly the very rare variety called Semper Augustus. Single bulbs of Semper Augustus were so hotly desired that they were being sold for a price equivalent today to 10 or 15 million dollars. But when the tulip bubble burst, fortunes were wiped out and the Dutch economy reeled from the blow.

*The Botany of Desire* visits Dutch scientists, breeders and the awe-inspiring Aalsmeer Flower Market, through which passes one out of every three flowers sold in the world. One of the largest buildings on the planet — larger than 200 football fields — the Aalsmeer market sees some 19 million flowers change hands each day. Pollan says, "Flowers are exquisitely useless. They're this great froth of extravagance in our lives. But that there is a multibillion-dollar trade in these wonderful, useless, beautiful things is kind of great."

*"Everyday roles and values are suddenly, thrillingly, suspended, and astounding new possibilities arise."*

– Michael Pollan,
*The Botany of Desire*



# Discussion Questions

1. Pollan talks about a flower's ability to "take over the world" with its visual and aromatic offerings. Which do you think is more important: beauty or aroma? Does the combination of the two create a whole that is greater than the sum of its parts? If so, how?

2. Why do you think we tend to see unhealthy plants and animals as unattractive? How does that fact square with the 17th century Dutch love affair with "broken" tulips such as the Semper Augustus? Is there a paradox?

3. "Tulip mania" swept through Holland in the 17th century. What similar "manias" have occurred in the US? Was the bursting of the "dot com bubble" similar? Any others in the last 50 years come to mind?

4. Unlike most apple growers, tulip gardeners are constantly exploring new varieties of tulips. Why do you think we consumers have a broader visual appetite than we seemingly do for things we eat? Are there long-term ramifications for these two differing approaches to farming? What might those ramifications be?

5. Flowers, according to Pollan, are "exquisitely useless." What does this phrase mean to you? Do you agree with it? If they are useless, why are they so important to so many of us?

# Chapter 3: Intoxication

While tulip breeders certainly pay meticulous attention to their plants, nothing compares to the high-tech, 24-hour intensive care provided by the growers of another seductive plant: cannabis, better known to Americans as marijuana. *The Botany of Desire* explores the history and physiology of this lowly weed – one that has managed to make itself so desirable that nearly 15 million Americans risk arrest each month by smoking it.

While fruits produce sweetness and flowers produce beauty, some plants produce chemicals that have the power to alter human consciousness. And, like our craving for sweetness or love of beauty, the desire to change consciousness appears to be hardwired into humans. Cannabis has cashed in on that desire and spread from its birthplaces in India and China throughout the world where passionate, and mostly illegal, gardeners tend to its needs with uncompromising devotion.

Almost all societies permit the use of some form of intoxicant, although they differ on which substances to favor and which to forbid. Cannabis is now illegal in most countries, but many cultures throughout history have embraced it. In 19th century America, it was a common treatment for labor pains, asthma and rheumatism. But Americans' perception of cannabis began to change when, in the 20th century, Mexican immigrants brought with them across the border the habit of smoking the plant they called "marijuana." The practice soon spread to the jazz community, and was eventually embraced by an entire generation in the 1960s.

The ensuing U.S. government crackdown on marijuana had the unintended consequence of driving a great deal of U.S. cannabis growing indoors. There, hidden from sight, the plant could be pampered under controlled growing conditions, and the levels of its psychoactive ingredient, THC, could be steadily increased. Because of these indoor growers' passionate attention to their plants' every need, Pollan calls these illicit cultivators of cannabis "the best gardeners of my generation."

*The Botany of Desire* travels to Israel to visit Raphael Mechoulam, the scientist who discovered THC in the 1960s and who also, decades later, discovered that we humans manufacture our own THC-like substance inside our own brains. It's called anandamide, and it seems to be critical to a vitally important, yet often-overlooked, mental process: forgetting. Researchers hope to tap into anandamide's power to someday help people who suffer from mental disorders that involve an inability to forget, such as post-traumatic stress disorder.

Chapter 3

# Discussion Questions

1. The film asserts that human beings have an innate drive to experience other states of consciousness. Why do you think that is? How do we most commonly explore altered states? Religion? Meditation? Running, yoga, or other types of exercise? What evolutionary benefit is there to this drive?

2. "Marijuana seems to 'second the motion' no matter what the motion is." What does this sentence mean to you?

3. Think about the notion of "unintended consequences" of the drug war in relation to marijuana. How did those unintended consequences affect the plant? How did they impact us?

4. Cannabis grows naturally in the wild (when allowed to do so) and requires no processing to be used as an intoxicant. Is that a justification for making it a legal substance? Why or why not? Is the cannabis plant different in substantial ways from tobacco, or from the grains we distill into alcohol?



# Chapter 4: Control

The potato — a plant that yields an abundant amount of food per acre — has not only thrived but also greatly expanded its habitat by gratifying our desire to exert control over our environment. Not content with the potato in its natural state, we have tried to alter this plant by means of genetic engineering — a recently developed technology that marks a quantum leap in our relationship to plants.

Our relationship to the potato began in the Andes Mountains of Peru. It was there, more than 8,000 years ago, that the plant was first domesticated, and more than 5,000 different varieties of potatoes are still grown there today. After the Spaniards conquered Peru in the 16th century, they took the potato back with them to Europe, where it helped to change the course of history. Here was a plant that could prosper in cool, rainy places with poor soils, such as Ireland. But unlike the Peruvians, the Irish grew mainly one single type of potato, the Lumper. The Irish potato fields, with their genetic uniformity, soon became vulnerable to biological pests. In the 1840s, when a virulent spore swept through the island nation, almost the entire potato crop was wiped out. The ensuing famine was so severe that it killed one out of every eight people in Ireland.

Says Pollan, "The Irish potato famine is the great cautionary tale of putting all your eggs in one basket, and the great cautionary tale about monocultures of all kinds. It's a parable about the importance of biodiversity, and it's a parable we forget at our peril." Yet this parable has already been forgotten in America, where consumer demand for perfectly uniform French fries has resulted in the planting of another monoculture potato crop — the Russet Burbank.

A great many of our Russet Burbanks are grown in Idaho, where the potato plants are watered by huge irrigation systems and sprayed regularly with fertilizers and chemical pesticides. The film contrasts this "industrial" method of agriculture with organic farming, which avoids chemicals and encourages genetic diversity. Though organic yields may be lower, organic farmers' costs are, too, because they save money by not using chemicals.

*The Botany of Desire* also examines the story of the genetically modified New Leaf potato: an attempt to kill pests with fewer toxins by exploiting advances in biotechnology. Introduced by the biotech giant Monsanto in 1995, the New Leaf contained a gene from a soil bacterium that had been inserted into the potato's DNA – a gene that helped to kill the dreaded Colorado potato beetle without pesticide sprays. But after rising public concern about the possible effects of genetically modified food, and publicity problems for restaurant chains like McDonald's, the New Leaf was taken off the market.

Are there viable choices for farmers who need to resist pests, other than spraying with pesticides or genetically modifying plants? Yes, argues Pollan. "If you are willing to abandon monoculture, there are other ways to do it." Organic farmers, who grow a wide assortment of potato varieties, are doing just that, finding consumers willing to forgo uniformity to gain variety, flavor and the appeal of a plant raised free from chemical pesticides.



# Discussion Questions

1. Early Peruvians adapted to nature in their attempts to domesticate potatoes. More recently, cultivators have sought to control nature, rather than allowing it to control them. What are the long-term implications for the two approaches to farming? Is one way inherently better than another? How about in the short-term? For the poor? For local communities? For global food systems? Overall?

2. Does American potato farming face the same kind of danger the Irish did during the potato famine? What are the similarities and differences? What would a modern day potato blight mean if one occurred in the U.S. today?

3. "Monocultures on the plate lead to monocultures on the land," Pollan asserts. In your view, is it the responsibility of the farmer or the consumer to consider biodiversity (if it should be considered at all)?

4. Genetically Modified Organisms (GMOs) enable farmers to grow crops with fewer pesticides. However, critics argue that when we eat GMOs we do not know exactly what we're putting into our mouths or what the long-term effects might be. In your opinion, are GMOs a net plus or a net minus for our U.S. food system? What about food systems in malnourished countries? Is the conclusion always the same? Why or why not?

5. Is spraying chemical insecticides onto crops different than putting natural insecticides directly into plants' genes, as the New Leaf potato did? Why or why not?

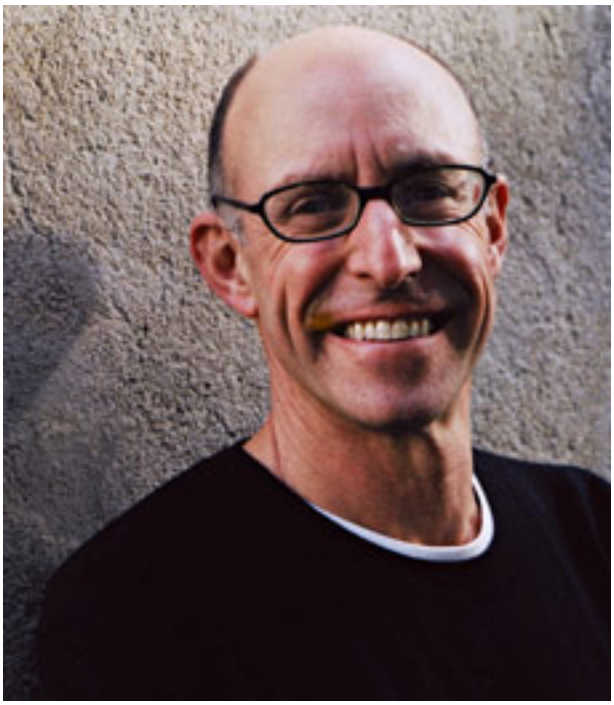
6. Is there a difference between the apple research and crossbreeding being done at the Cornell University lab in Geneva, New York, and Monsanto's genetic engineering efforts like the New Leaf potato? How are they similar or different?

7. A scientist in the film suggests that BT potatoes offer benefits solely to the farmer and not to the consumer. What if prices could be lowered significantly or calories per serving increased dramatically? Would GMO products then be more acceptable to you? To the general public? Why or why not?

8. If biodiversity can't scale up in size to industrial farming system needs, should we alter the system size downward? Or should we focus our efforts on ways to support large-scale monoculture? What are the factors that led you to form your opinion?

# Michael Pollan

## About Michael Pollan



For the past twenty years, Michael Pollan has been writing books and articles about the places where the human and natural worlds intersect: food, agriculture, gardens, drugs, and architecture. Pollan is the author, most recently, of *In Defense of Food: An Eater's Manifesto.* His previous book, *The Omnivore's Dilemma: A Natural History of Four Meals,* was named one of the ten best books of 2006 by *The New York Times* and *The Washington Post*.

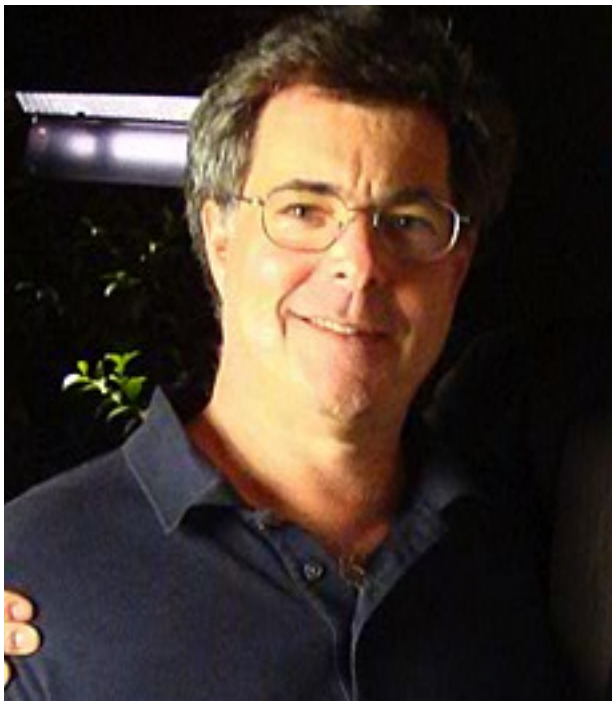
Pollan's 2001 book, *The Botany of Desire: A Plant's-Eye View of the World*, was also a *New York Times* bestseller, received the Borders Original Voices Award for the best non-fiction work of 2001, and was recognized as a best book of the year by the American Booksellers Association and amazon.com. He is also the author of *A Place of My Own* (1997) and *Second Nature* (1991).

Pollan was recently honored with the President's Award from the American Institute of Biological Sciences and The Truth in Agricultural Journalism Award from the American Corn Grower's Association. In addition to publishing regularly in *The New York Times Magazine,* his articles have appeared in *Harper's* (where he served for many years as executive editor), *Mother Jones, Gourmet, Vogue, Travel + Leisure, Gardens Illustrated,* and *The Nation.*

In 2003, Pollan was appointed the John S. and James L. Knight Professor of Journalism at UC Berkeley's Graduate School of Journalism, and the director of the Knight Program in Science and Environmental Journalism. In addition to teaching, he lectures widely on food, agriculture, and gardening. Pollan, who was born in 1955, grew up on Long Island, and was educated at Bennington College, Oxford University, and Columbia University, from which he received a Master's in English. He lives in the Bay Area with his wife, the painter Judith Belzer, and their son, Isaac. His website is www.michaelpollan.com.

# Michael Schwarz

## About Michael Schwarz, Producer and Director



Michael Schwarz founded Kikim Media in 1996 after working for 20 years in public television. Schwarz's work has been honored with three national Emmy Awards, two George Foster Peabody Awards, the Alfred I. duPont-Columbia University Journalism Award for Investigative Journalism, the Investigative Reporters and Editors Award, and the Grand Prize in the Robert F. Kennedy Journalism Awards for Coverage of the Disadvantaged.

Schwarz's most recent nationally broadcast prime-time PBS programs were *My Father, My Brother and Me*, a chronicle of Parkinson's disease, for FRONTLINE (2009); and *Hunting the Hidden Dimension*, the story of fractal geometry, for NOVA (2008). He also produced and directed *Ending AIDS: The Search for a Vaccine* (2005), as well as the groundbreaking *Muhammad: Legacy of a Prophet* (2002).

After starting his career as a writer and editor of print publications (together with another young writer/editor named Michael Pollan), Schwarz joined England's Granada Television, where he was assigned to World in Action, the top-rated public affairs series that inspired the creation of *60 Minutes*. Schwarz returned to America to co-produce and write *Abortion Clinic*, a landmark documentary shown as part of FRONTLINE's inaugural season, which earned the series its first Emmy award. The following year Schwarz co-produced *Living Below the Line* for FRONTLINE, which was honored with two more Emmy Awards as well as the Grand Prize in the Robert F. Kennedy Journalism Awards.

After spending two years on a Fulbright Fellowship teaching broadcast journalism in Malaysia, India, Sri Lanka, Indonesia and Papua New Guinea, Schwarz joined PBS station KQED in 1988. While at KQED, Schwarz brought to the station (and to national broadcast on AMERICAN PLAYHOUSE) Channel Four's *Armistead Maupin's Tales of the City*, for which he served as KQED's executive producer and which won a George Foster Peabody Award. Schwarz lives in the Bay Area with his wife Kiki Kapany, a family lawyer who acts as Vice President of Kikim Media, running its day-to-day operations. They have two daughters, Ariana and Marisa. Kikim's website is www.kikim.com.